Watershed Protection: A Statewide Approach
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Chapter 1. The Watershed Protection Approach

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1.1 Historical Perspective

The concept of water resources management within watersheds originated as early as the 1890s with the work of the U.S. Inland Waterways Commission. The Commission, with the backing of President Roosevelt, reported to Congress in 1908 that each river system -- from its headwaters in the mountains to its mouth at the coast -- is an integrated system and must be treated as such (Inland Waterways Commission, 1908). The focus of water resources management then and throughout the first half of the century was on efficient use of water resources for such purposes as energy production, navigation, flood control, irrigation, and drinking water.

The 1950s and 1960s saw increased emphasis on improving ambient water quality and protecting the Nation's drinking water, much of which comes from ground water. The Federal Water Pollution Control Act of 1956 provided large-scale funding of publicly owned treatment works. The Water Quality Act of 1965 required states to develop water quality standards for interstate waters. River basin compacts were formed to protect major systems such as the Delaware and Colorado Rivers. Some state sanitation commissions adopted a river basin approach to their work. They developed basin plans that classified individual waterbodies according to their best uses. These early water quality managers walked, boated, and drove throughout entire river basins, documenting outfall pipes and collecting ambient samples.

1.2 The Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments (PL92-500) established as a national goal the restoration and maintenance of the physical, chemical, and biological integrity of the Nation's waters. The dominant features of this Clean Water Act (CWA) were a Federal permitting program (the National Pollutant Discharge Elimination System or NPDES) and massive funding for wastewater treatment and state water quality programs. Under NPDES, each discharger receives a permit containing numerical effluent limits that are, at a minimum, based on best available wastewater treatment technology or other guidelines (technology-based limits); more stringent limits are issued where needed to take into account the condition of the waterbody (water quality-based limits).

Under Section 303(e) of the CWA, states prepared basin plans for controlling their point source problems. These plans consolidated most known information about dischargers and water quality and helped form the basis for grant decisions for wastewater treatment. Mathematical models were used to determine allowable loads from municipal and industrial treatment plants. However, after the initial plans were completed, most states maintained only a limited basin planning function while focusing on individual point source problems.

The CWA also set the stage of early ground water protection efforts. Under Section 102, EPA, states and other federal and interstate agencies are authorized to develop comprehensive programs to reduce, prevent and eliminate pollution to ground water and surface waters. This authority, and the Resource Conservation and Recovery Act, the Federal Insecticide, Fungicide,

and Rodenticide Act and other laws provided for the initiation of Comprehensive State Ground Water Protection Programs (CSGWPPs).

In the 1987 amendments to the CWA, Congress required states to expand their programs for dealing with toxicants, nonpoint sources (NPSs), wetlands, water quality standards and other topics. These requirements have strained state budgets and made multi-agency programs such as NPS management more difficult to coordinate effectively. Moreover, the states' progress in eliminating point source pollution has revealed that NPS pollution and habitat degradation account for most of the Nation's remaining water quality problems (U.S. Environmental Protection Agency [EPA], 1994a).

1.3 The Safe Drinking Water Act

The 1974 Safe Drinking Water Act (SDWA) drew together several important programs protecting public health that now need to be considered within a comprehensive Watershed Protection Approach. Then, in the late 1970's, hazardous waste sites were found to be affecting public water systems. Some of these sites suffered from surface water intrusion and contaminated ground water discharge. The 1986 amendments established further the basis for protecting ground water supplying drinking water to public water systems and private users. The types of contaminants that must be removed by drinking water systems was quadrupled. The requirements for testing this expanded list of contaminants impose significant costs on State and local drinking water monitoring programs.

EPA has also established the Source Water Protection and Wellhead Protection Programs under the SDWA. Source Water Protection emphasizes preventing contamination of drinking water resources and includes wellhead protection and sole source aquifer watershed control plans. The Wellhead Protection Program sets priority on contamination to ground waters that will provide drinking water in the next 5 to 20 years. It relies upon hydrologic models of ground water flow to define the protection area which may include the portion of the stream and the watershed upstream from the well. The Sole Source Aquifer Program allows the public to define entire aquifers that provide at least half the population's drinking water, whether for public or private use. Watershed control plans under the surface water treatment rule are used to define the area providing drinking water to a public water system experiencing microbial contamination. The area is to be managed to reduce or eliminate contaminant sources.

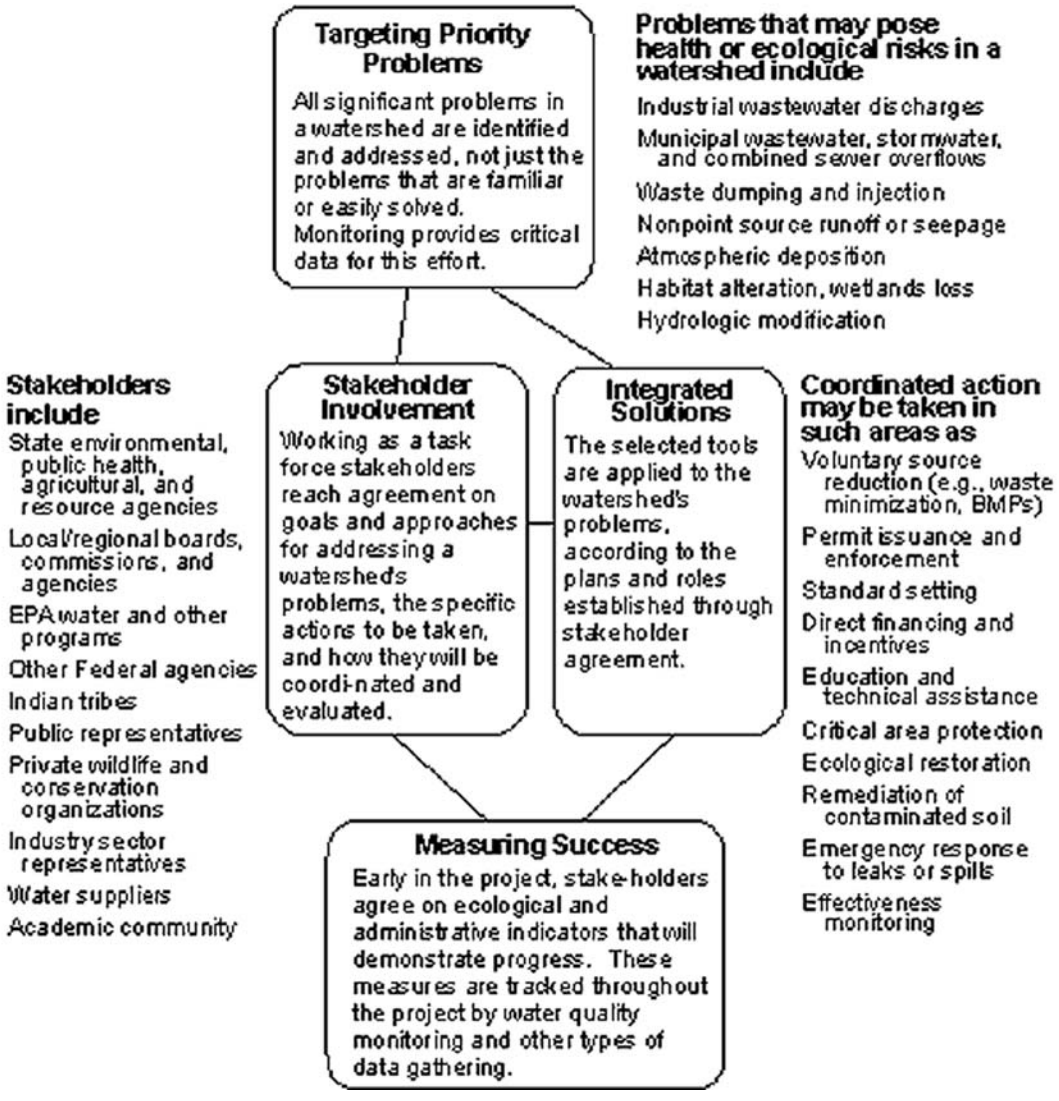
1.4 The Watershed Protection Approach (WPA)

A comprehensive approach to water resource management is needed to address the myriad water quality problems that exist today from nonpoint and point sources as well as from habitat degradation. The WPA is a management approach for more effectively protecting and restoring aquatic ecosystems and protecting human health. The EPA Office of Water is using this approach to focus on hydrologically defined resource areas -- watersheds and aquifers. The WPA recognizes that water quality management must embrace human and ecosystem health and that managing for one without considering the other can be detrimental to both. The WPA allows managing a range of inputs for specific outputs. It emphasizes all aspects of water quality including chemical water quality (e.g., toxicants and conventional pollutants), physical water

quality (e.g., temperature, flow, circulation, ground and surface water interaction), habitat quality (e.g., channel morphology, substrate composition, and riparian zone characteristics), biological health and biodiversity (e.g., species abundance, diversity, and range) and subsurface bio-geochemistry.

The WPA has four major features: targeting priority problems, stakeholder involvement, integrated solutions, and measuring success (Figure 1-1). It is important to note that the WPA is not a new program that competes with or replaces existing water quality programs; rather, it is a framework within which ongoing programs can be integrated effectively. Further, a watershed approach can provide benefits to individual citizens and the public and private sectors.

Figure 1-1. Features of the Watershed Protection Approach



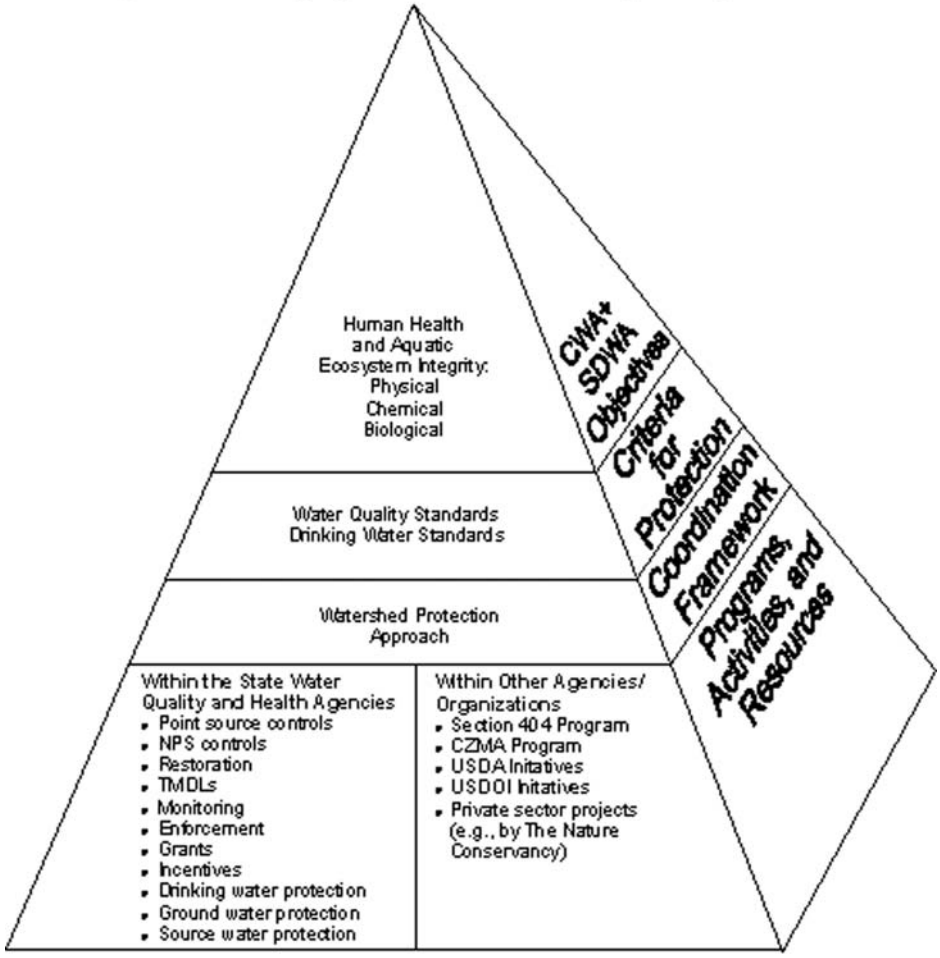
Individual citizens benefit because watershed protection improves the environment. The public sector benefits because agencies can accomplish more through cooperation with other stakeholders than they can on their own with limited resources. The participation of local organizations ensures that those who are likely to be most familiar with a watershed, its problems, and possible solutions play a major part, often a leadership role. The private sector can benefit because the burden of water resource protection is distributed more equitably among pollution sources. All stakeholders benefit because they can participate in decisionmaking that is based on a comprehensive assessment of the watershed including all interacting aquifers.

The features of the WPA shown in Figure 1-1 include a strong monitoring and evaluation component. Using monitoring data, stakeholders identify stressors that may pose health and ecological risk in the watershed and any related aquifers, and prioritize these stressors. Monitoring is also essential to determining the effectiveness of management options chosen by stakeholders to address high-priority stressors. Because many watershed protection activities require long-term commitments from stakeholders, stakeholders need to know whether their efforts are achieving real improvements in water quality.

Figure 1-2 illustrates how the WPA fits into the context of CWA implementation by a state water quality agency. The peak of the pyramid represents the goal of restoring and maintaining ecosystem integrity for human and aquatic health. Water quality standards and other environmental objectives are the measures of ecosystem integrity that comprise the next level of the pyramid. As suggested by its position in the pyramid, one purpose of the WPA is to integrate the many individual programs that have evolved to implement the goals of the CWA (e.g., to restore, protect and maintain the physical, chemical and biological integrity of the Nation's waters) and the SDWA (e.g., to protect human health through source water protection).

CWA Section 303(d) and the Total Maximum Daily Load (TMDL) process provide one key legislative and technical underpinning for the WPA. A TMDL may involve all of the actions or programs shown: point and nonpoint source controls, monitoring, and restoration. Similarly, SDWA programs for Source Water Protection and Wellhead Protection can be key components of the WPA. Each state may make more or less use of each of these CWA and SDWA programs, tailoring them to create its unique watershed approach. Various sources of funding may be brought to bear to carry out the WPA (e.g., federal grants, state appropriations, and permit fees).

Figure 1-2. Emerging framework for achieving CWA goals.



The pyramid includes initiatives by other agencies as integral components of a WPA. Examples within the U.S. Department of Agriculture include the Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service or SCS) Small Watersheds Program; another NRCS initiative to delineate consistent watersheds nationwide; and the U.S. Forest Service's South Fork Salmon River Project, where restoration efforts seek to mitigate sediment impacts from past livestock grazing, logging, and road building activities.

The WPA has evolved over the past several years. In 1991, EPA produced an initial framework document that discussed EPA's concept for watershed protection and outlined EPA's potential role in watershed protection efforts (U.S. EPA, 1991). Since that time, EPA has provided support to states and other entities to help build on the many existing regional, state, and local watershed-based programs and watershed projects. Following extensive consultation with the States, EPA issued its National Guidance for Comprehensive State Ground Water Protection Programs (U.S. EPA, 1993a). EPA has worked with many other Federal agencies to harmonize the WPA with other agency approaches. EPA has jointly and singly sponsored numerous conferences on watershed management.

Point source controls and other traditional approaches to water quality management have been effective to date in resolving many of our Nation's water quality problems. The WPA provides a flexible model for tackling the complex environmental problems that we still face today. In addition, the growing number of water resource programs with overlapping functions requires the coordination and integration that a watershed approach can provide. A watershed approach also allows new partnerships to form among federal, state, and local agencies, citizens, and the private sector that are focused on a specific resource. Finally, the WPA's emphasis on stakeholder participation fosters a sense of ownership and stewardship of local resources.

1.5 Managing by Hydrologic as Well as Political Units

Watershed boundaries seldom if ever coincide with jurisdictional boundaries such as state, county or town lines. Like watersheds, aquifers too are natural hydrologic units that seldom match jurisdictional boundaries but have unique management needs. This has long presented a special challenge to local and state water resource managers whose geographic areas of responsibility are politically rather than hydrologically based. It further complicates matters that watersheds occur on a range of scales from the sub-national or regional (e.g., the Mississippi watershed) down to local scale (e.g., the watershed of a small creek). At any scale, watersheds and aquifers function as natural systems within which resource managers and stakeholders can work to establish and maintain the best possible combination of ecological condition and human health and welfare.

It is possible to organize watershed management around watersheds at scales large or small. In an average state, there may be ten or more major watersheds containing several hundred moderately-sized watersheds, and thousands of still smaller watersheds within these. Given the variety of scales and geographic units available, then, how can state resource managers best implement their programs on watershed management units?

One framework that states use to implement the WPA focuses on organizing and managing by the state's major watersheds, which are frequently called basins in this document. This flexible framework encompasses management and protection of ecosystems and human health at three levels: the state, the basin, and the watersheds (and aquifers) within each basin. Some issues, such as controlling nutrient loading to small lakes or restoring headwaters riparian habitat quality, are best addressed at the local watershed level. Other issues may be best addressed at the basin level, such as phosphate detergent bans, wetlands mitigation banking, or nutrient trading. Still other activities and solutions are best implemented at the state level, including policies on toxics control or the operation of permit programs.

Typically, the state's basins and selected major aquifers become the primary management units in this framework. Program activities such as permitting, monitoring, modeling, and water quality planning are scheduled for each basin on a rotating five-year cycle covering all the state's basins. Other activities such as compliance and enforcement are ongoing throughout the cycle. Products include an initial state framework document describing this approach and individual basin management plans that are updated every five-year cycle (Figure 1-3).

When states manage by basins, their programs are organized around a limited and manageable number of major watersheds occurring within the state. Basin-level activities can be coordinated more broadly with statewide actions and policies, or more locally with watersheds of concern within a basin. This approach can be an improvement on past approaches to water resources management because it compels managers to focus on systems (basins, watersheds and aquifers), how well these systems are working, and how the management needs for these systems differ from watershed to watershed.

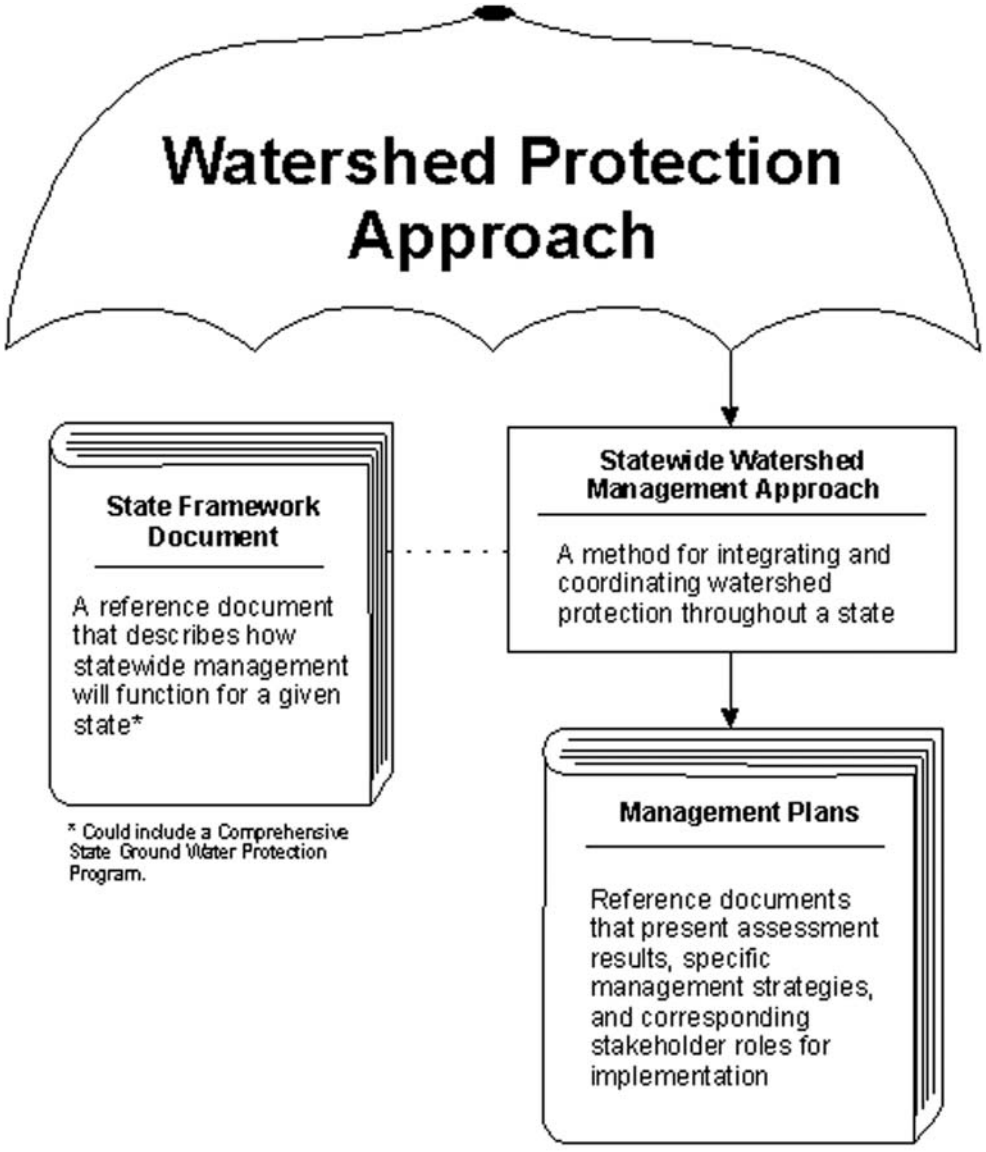


Figure 1-3. Statewide watershed management and key documents resulting from the approach.

1.6 Purpose of This Document and Intended Audience

This guide is about the process of establishing a statewide WPA. It is not technical guidance and does not cover topics such as monitoring or permitting issues in detail. Rather, it presents common themes or elements among states that have adopted or begun the transition to watershed management -- states such as Delaware, Idaho, Nebraska, North Carolina, South Carolina, Texas, and Washington. Chapter 2 describes these common elements. Chapter 3 addresses the benefits of statewide watershed management, and Chapter 4 discusses how a state can begin to implement this approach. Chapter 5 lists references. Additional information about how ground water protection fits into the approach is presented in Appendix A, and Appendix B focuses on Nebraska's basin cycle.

This document is intended for state water resource managers and technical personnel as well as for the natural resource managers in other state, federal, tribal and local agencies with whom they cooperate. By outlining the components of a statewide approach and by providing examples of how some states are currently operating under such an approach, the document encourages the adoption of watershed-based water quality management by other states.

A companion report, *Watershed Protection: A Project Focus* (U.S. EPA, 1995), describes key elements of local-scale watershed projects. Larger watersheds or basins can provide the framework for coordinating multiple watershed projects around the state, for targeting resources, and for operating permit and monitoring programs. At the same time, other water quality and ecosystem protection activities can be managed best at the watershed level. Examples include controlling point and nonpoint source pollutant loadings to a lake or to a stream recharging an aquifer and restoring riparian habitat in the headwaters of a watershed.